

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:

**TRANSLATION**  
**PCT**

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:		Date of mailing (day/month/year) <b>See form PCT/ISA/210</b>
Applicant's or agent's file reference <b>AM 1987 CBL/mg</b>		<b>FOR FURTHER ACTION</b> See paragraph 2 below
International application No. <b>PCT/FR2004/002481</b>	International filing date (day/month/year) <b>01.10.2004</b>	Priority date (day/month/year) <b>04.11.2003</b>
International Patent Classification (IPC) or both national classification and IPC <b>C07C57/04, C07C57/07</b>		
Applicant <b>ARKEMA</b>		

1.	This opinion contains indications relating to the following items:  <input checked="" type="checkbox"/> Box No. I      Basis of the opinion <input type="checkbox"/> Box No. II      Priority <input type="checkbox"/> Box No. III      Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV      Lack of unity of invention <input checked="" type="checkbox"/> Box No. V      Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI      Certain documents cited <input type="checkbox"/> Box No. VII      Certain defects in the international application <input type="checkbox"/> Box No. VIII      Certain observations on the international application
2.	<b>FURTHER ACTION</b>  If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.  If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.  For further options, see Form PCT/ISA/220.
3.	For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/EP	Authorized officer
Facsimile No.	Telephone No.

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Box No. I	Basis of this opinion
1.	<p>With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.</p> <p><input type="checkbox"/> This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).</p>
2.	<p>With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:</p> <p>a. type of material</p> <p><input type="checkbox"/> a sequence listing</p> <p><input type="checkbox"/> table(s) related to the sequence listing</p> <p>b. format of material</p> <p><input type="checkbox"/> in written format</p> <p><input type="checkbox"/> in computer readable form</p> <p>c. time of filing/furnishing</p> <p><input type="checkbox"/> contained in the international application as filed.</p> <p><input type="checkbox"/> filed together with the international application in computer readable form.</p> <p><input type="checkbox"/> furnished subsequently to this Authority for the purposes of search.</p>
3.	<p><input type="checkbox"/> In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.</p>
4.	<p>Additional comments:</p>

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Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
<b>1. Statement</b>			
Novelty (N)	Claims	1-16	YES
	Claims		NO
Inventive step (IS)	Claims	1-16	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-16	YES
	Claims		NO
<b>2. Citations and explanations:</b>			
<p>The present application relates to the purification of (meth)acrylic acid (AA) by passage of a crude product over an absorption column C1 with hydrophobic heavy solvent in counter-current at a rate 3 to 5.6 times the rate of AA, followed by passage over a rectifying column C2 <b>without reflux</b>, the bottom fraction from C1 being introduced at the top of C2. The AA is recovered at the bottom of C2 with the heavy solvents.</p> <p>Reference is made to the following documents cited in the international search report:</p> <p style="margin-left: 40px;">D1: EP-A-1 125 912 (NIPPON CATALYTIC CHEM IND) 22 August 2001 (2001-08-22)</p> <p style="margin-left: 40px;">D2: EP-A-0 784 046 (BASF AG) 16 July 1997 (1997-07-16)</p> <p style="margin-left: 40px;">D3: FR-A1-2 196 986 (BASF AG) 22 March 1974 (1974-03-22)</p> <p>D1 discloses the purification of (meth)acrylic acid by passage of a crude product over an absorption column with circulation of hydrophobic heavy solvent in counter-current at a rate from 0.2 to 4.5 that of the AA,</p>			

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followed by introduction at the top of a distillation column under reduced pressure and **reflux**, the distillation bottom fraction, containing AA and heavy products, being distilled in order to obtain AA without solvent.

D2 relates to the separation of AA by passage over an absorption column with counter-current circulation of heavy solvent, followed by introduction at the top of a desorption column and, finally, distillation of the bottom fraction in order to separate off the solvent. The solvent flow rate/AA flow rate ratio is not mentioned for the first absorption column.

D3 represents essentially the same teaching as D2.

D1 is the closest prior art and, although the flow rate range of heavy absorption solvent overlaps partially with that used in the present application, D1 nevertheless differs in the 2nd step, the present process using a rectifying column **without reflux**, with introduction of the products to be distilled at the top, whereas D1 uses a standard distillation column with reflux, with introduction at the top.

In the application, the rectifying column C2 without reflux, with feed to the top of the column, functions rather like a desorption column, except that there is no addition of external gas, the desorption gas being provided by the boiling of the mixture by means of a boiler in the lower part of the column (cf. page 17). Hence the use of the term "rectifying without reflux".

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The other documents do not disclose a AA flow rate/heavy solvent flow rate ratio and do not use the rectifying column in a 2nd stage, as does the present application, but instead use desorption by stripping by means of the introduction of external gas at the bottom of the column. The process of the present application operates the 2 columns interdependently and makes it possible to obtain results which are advantageous and surprising relative to the prior art (cf. application page 10 line 21-page 12 line 2).

The subject matter of claim 1 and of dependent claims 2-16 ought to meet the requirements of PCT Article 33(3) and (3).